108. (New) The communication system of claim 107, in which oscillator of the first loop is coupled to the first mixer.

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109. (New) The communication system of claim 108, in which oscillator of the second loop is coupled to the second mixer.

110. (New) The communication system of claim 105, in which the first loop has a wide bandwidth to acquire carrier frequency lock and the second loop has a narrow bandwidth to track carrier frequency after carrier frequency lock.

REMARKS

New claims 105-110, which are dependent upon independent claim 10 are presented for examination.

Claim 10 stands rejected under 35 U.S.C. § 102 as being anticipated by Eyuboglu Patent No. 4,745,625 and Tsui, et al. Patent No. 6,278,730. As stated on page 3, lines 7-19, and numerous other places in applicants' written description, the claimed digital communication system processes a pilot signal called "an inserted predetermined frequency component" in claim 10. Claim 10 further provides that the three recited loops operate in response to the predetermined frequency component. This requirement is not disclosed in the references relied upon by the Examiner. Accordingly, it is submitted that claim 10 is patentable over the references of record. not in the claimed

New claims 105-110, which are dependent upon claim 10 are patentable for the same reason, as well as the new limitations specifically introduced thereby.

In view of the amendments made at this time and the foregoing remarks, reconsideration of claim 10, consideration of new claims 105-110, and allowance of this application are requested.

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with marking to show changes made.**"

Respectfully submitted,

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By ________________________________

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Please amend the paragraph beginning on page 20, line 28, to read as follows:

Prior to being directed to the Nyquist prefilter 26 and adaptive equalization block 24, filtered signals are provided from the square-root Nyquist filter 22 to an NTSC co-channel interference rejection filter 28, for removal of the luma, chroma, and audio subcarrier signals from the frequency spectrum. When used in a terrestrial environment, there exists the possibility of co-channel interference from terrestrial-type NTSC transmitters. The NTSC co-channel rejection filters 28 function as an adaptive digital filter which places precisely located notches in the frequency spectrum at the specific locations of the NTSC luma, chroma, and audio subcarriers. An NTSC co-channel rejection filter suitable for implementation in connection with the dual mode QAM/VSB receiver system of FIG. 1, might be one such as described in co-pending patent application serial No. 09/303,783, filed, May, 11, 1999, now U.S. Patent No. 6,219,088 and entitled "NTSC REJECTION FILTER", commonly owned by the Assignee of the present invention, the entire disclosure of which is expressly incorporated herein by reference.

Please amend the paragraph beginning on page 27, line 22, to read as follows:

Turning now to FIG. 4, there is depicted in detail, one of the complex signal paths of the front end architecture described in FIG. 1, illustrating the acquisition/tracking loops comprising circuit 30. This arrangement can be regarded as "unitary" in that both functions, frequency acquisition and tracking and symbol timing (also termed "baud recovery") are operable in response to the pilot (unsuppressed carrier) signal. In the embodiment of FIG. 4, an input IF spectrum is digitized by an analog-to-digital converter (A/D) and the resulting digital complex signal is directed to a complex mixer [~~50~~] 18 where it is combined with a complex signal having a characteristic frequency f_C equal to the carrier frequency. The resulting complex signal is processed by a highband filter and variable rate interpolator, represented as a single processing block in the embodiment of FIG. 4, and denoted HB/VID [~~52~~] 20. In a manner to be described in greater detail below, symbol timing is performed by a baud loop coupled to provide symbol timing information to the variable rate interpolator (VID) portion of the HB/VID filter [~~52~~] 20. Following interpolation, baseband IF signals are processed by a square root Nyquist filter which has a programmable roll off α of from about 11 to about 18%. The square root Nyquist filter [~~54~~] 22 is further

designed to have a particular cutoff frequency that has a specific relationship to the VSB pilot frequency f_C, when the VSB spectrum centers at DC. In a manner to be described in greater detail below, this particular cutoff frequency is chosen to have this particular relationship in order that both carrier recovery and symbol timing recovery might be based on a VSB pilot frequency enhancement methodology.

Please amend the paragraph beginning on page 28, line 16, to read as follows:

An NTSC rejection filter 56 is provided in the signal path in order that interference components represented by the luma, chroma and audio subcarriers, present in NTSC terrestrial broadcast system signals, are removed from the digital data stream prior to the data being directed to the receiver system's equalizer. The NTSC rejection filter [~~56~~] 28 is an all digital, programmable notch filter, exhibiting quite narrow notches at specific, predetermined frequencies that correspond to the luma, chroma and audio subcarrier peaks. Although the NTSC rejection filter [~~56~~] 28 is contemplated as functioning to remove unwanted NTSC co-channel interference components, the characteristics and design of the NTSC rejection filter [~~56~~] 28 are such that it may be used to remove any form of interference component having a deterministic relationship to a particular input spectrum.

Please amend the paragraph beginning on page 29, line 18, to read as follows:

A carrier phase detector 60 is coupled to receive an input signal from a Nyquist prefilter [~~62~~] 26 coupled in turn to receive complex signal from a node between the second mixer 58 and the receiver's equalizer 64. The Nyquist prefilter [~~62~~] 26 is constructed as a high pass filter with a cutoff at the same particular characteristic frequency as the cutoff designated for the low pass root Nyquist filter [~~54~~] 22. The root Nyquist filter [~~54~~] 22 and Nyquist prefilter [~~62~~] 26 function in combination to define an equivalent filter that acts to define the pilot enhanced timing recovery characteristics of the receiver in accordance with the present invention. Complex, pre-filtered signals are directed to the input of the carrier phase detector which produces a 6-bit frequency error discriminant for use in the loop. The SGN function of these 6-bits are extracted and applied, simultaneously, to an inside loop filter 66 and an outside loop filter 68. The inside loop filter 66 drives an inside timing reference circuit, such as a direct digital frequency synthesizer (DDFS) which might also be implemented as a voltage controlled oscillator

(VCO) or a numerically controlled oscillator (NCO). Likewise, the outside loop filter 68 drives an outside timing reference circuit 72 which might also be suitably implemented as a DDFS, VCO, or an NCO. As was mentioned previously, the outside, or centering, loop functions to define a complex signal that might be expressed as sin Ω_{Ct} and cos Ω_{Ct}, where Ω_C represents the pilot (carrier) frequency. Since the pilot (carrier) frequency f_C is given, its position in the frequency domain, with respect to any sampling frequency f_S is deterministic. Therefore, if a receiver system wishes to lock its timing frequency to a particular F_S that has a fixed relationship with a known F_C, as in the case of the ATSC standard signals, it need only apply a phase lock loop that tracks the pilot. Axiomatically, the pilot signal will appear at the correct location in the spectrum if the sampling frequency F_S is correct. The pilot signal will be shifted to a lower frequency from its expected frequency location if the sampling frequency f_S is too high. Conversely, in the case where the sampling frequency f_S is too low, the pilot signal will appear to have been shifted to a higher frequency location from its expected frequency location in the spectrum.

In the Claims:

Please amend claim 10 and add new claims 105-110 as follows:

10. (Amended) A digital communication system[~~;~~] comprising:

a front end receiving an input spectrum at an intermediate frequency, the input spectrum including an inserted predetermined frequency component;

first and second nested tracking loops, the first loop acquiring carrier frequency lock in operative response to the predetermined frequency component of the received spectrum, the second loop providing a signal adapted to position the spectrum at a predetermined location relative to baseband in operative response to said predetermined frequency component; and

a third tracking loop coupled to define a symbol timing parameter in operative response to said [~~same~~] predetermined frequency component.